

his opinion. He replied in part that it "represents a type which I do not know from Europe or palearctic countries, but it has much the same features characteristic for several South American species," and also states that he had thought of making a new subgenus on the characters involved. This seems inadvisable for me to attempt on the basis of the single species represented among my material, so, for the present, it seems best to accept the genus *Sarcophaga* as a useful dumping ground. The more important characters which harmonize least with *Sarcophaga* are the vestiture of the back of the head, the broad front in the male, the stout nature of the chætotaxy throughout, the shape and vestiture of the abdomen in the male, and the genital segments and genitalia. There are other characters which would assume importance if they were duplicated in related forms.

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## NEW WESTERN GALL MIDGES.

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The following accounts of species are based largely on material collected and reared by Mr. P. H. Timberlake, of the U. S. Bureau of Entomology, while in Colorado and California, the observations on habits and life history notes being made by him. It will be noted that his work has disclosed the presence of a number of gall midges upon various composites, indicating the prevalence of somewhat the same conditions as are to be found upon related plants in the eastern states. The rearing of several species of *Diarthronomyia* is particularly interesting in connection with the recent discovery of the chrysanthemum midge, *D. hypogæa* H. Lw. in this country. There are included in this lot of descriptions two accounts of species of Lasioptera infesting the leaf sheaths or the lower portion of the stem of two grasses, new records due to the investigations of Mr. C. N. Ainslie, also of the U. S. Bureau of Entomology.

### ONODIPLOSIS new genus

This form, on account of the greatly reduced palpi, the somewhat produced mesonotum and the modified ovipositor, is allied to the

series referable to *Hormomyia* and its near associates, and particularly to *Monarthropalpus* Rubs. The type is *O. sarcobati* n. sp.

***Onodiplosis sarcobati*** new species.

This remarkable midge was reared May 24, 1914, by Mr. P. H. Timberlake from a bud gall on *Sarcobatus vermiculatus*, collected on the west shore of Utah Lake. Only two females were reared.

Gall. An irregular, oval bud deformation, fleshy, becoming hard and apparently composed of appressed, thickened bud scales, length 10 mm., diameter 6 mm.

Female.—Length 3.5 mm., sparsely haired, brownish yellow; 14 segments, the fifth with a stem one-third the length of the subcylindrical basal enlargement, the latter distinctly constricted near the middle and with a length two and one-half times its diameter; subapically and basally there are sparse whorls of short, stout setæ and apically and near the middle, low, rather broad circumfili; terminal segment reduced, irregularly suboval, with a length from one and one-fourth to nearly twice its diameter. Palpus consisting of an irregular, tapering, sparsely setose segment having a length about twice its diameter. Mesonotum shining dark brown or black. Scutellum a little darker, postscutellum reddish brown. Abdominal sclerites dark brown or black, the pleuræ dark red, the ovipositor reddish, with a tuft of long, silky, yellowish white hairs on the distal segment. Wings hyaline, subcosta uniting with the margin near the middle, the third vein well beyond the apex, the fifth vein indistinct distally, joining the posterior margin at the distal fourth, its branch near the basal half; halteres pale yellowish, fuscous apically. Coxæ black, the legs a nearly uniform reddish; claws long, slender, simple, the pulvilli as long as the claws. Ovipositor short, stout, with a length about one-half that of the abdomen, the basal segment much stouter, with a length about twice its diameter, the distal segment a little longer, much more slender, tapering to an obtusely rounded apex and thickly clothed with long, silky, yellowish white hairs, the latter having a length approximately one-half that of the segment.

Exuvium.—Length 3 mm., stout, the thoracic horns moderately stout, bidentate. Mesonotum, wing cases and base of antennal cases variably infuscate, the antennal cases hardly reaching the base of the abdomen, the wing cases extending to the third abdominal segment, and the leg cases to the fifth abdominal segment, the dorsum of the abdominal segments with numerous uniformly distributed, minute, triangular, chitinous points; posterior extremity broadly rounded. Type Cecid. 1642.

***Hormomyia caudata*** new species.

The midges described below were reared April 29, 1915, by Mr. George G. Ainslie, of the U. S. Bureau of Entomology, from what were evidently modified buds or shoots of a sedge, probably *Cyperus*

species collected April 15 at Clarksville, Tenn. The galls were found at the very base of the plant and at the time contained both larvæ and pupæ. The species is easily distinguished from other known females by the greatly produced fifth antennal segment in connection with its moderate size.

Gall.—Somewhat cylindrical, fleshy-walled, monothalamous, length 4 to 5 mm., diameter approximately half the length. The walls become thin upon maturity and rupture at the upper end, thus affording an opening for the escape of the pupa.

Pupa.—Length 3 to 4 mm., moderately stout, whitish, the older ones yellowish orange with brown eyes, wings and legs; thoracic horns rather long, nearly straight, light brown. Antennæ extending to the third abdominal segment, the wings to the fourth and the legs to the sixth and seventh. The dorsum of the abdominal segments thickly spotted with chitinous points and near the middle a broad, transverse band of relatively long, stout, chitinous points.

Female.—Length 4 mm. Antennæ extending to the third abdominal segment, sparsely haired, light brown; 14 segments, the fifth with a short stem about one-fifth the length of the cylindrical basal enlargement, which latter has a length about four times its diameter and moderately long circumfili at the basal fourth, the distal third and subapically; terminal segment somewhat produced, the basal enlargement with a length four times its diameter and apically a moderately long, stout, knob-like process. Palpi; first segment subquadrate, the second narrowly oval, the third greatly produced, with a length five times its diameter. Mesonotum reddish brown. Scutellum and postscutellum probably lighter. Abdomen yellowish orange. Wings hyaline; halteres yellowish basally, reddish fuscous apically. Coxæ and legs mostly pale straw, the claws strongly curved, simple, the pulvilli plainly longer than the claws. Ovipositor about one-half the length of the abdomen, the terminal lobes almost linear, tapering slightly distally and with a length over four times the width. Color characters largely conjectural. Type Cecid. a2718.

*Asphondylia adenostoma* new species.

The small gall midge described below was reared June 4, 1912, by Mr. P. H. Timberlake from apparently unmodified seeds of *Adenostoma fasciculatum* collected in Laurel Canyon near Hollywood, Cal., May 30, 1912. The seeds or achenes were unmodified externally, the midge issuing through a hole in the side, the pupal exuviae being left in a partly protruding position.

Female.—Length 2 mm. Antennæ extending to the second abdominal segment, rather thickly haired, black; 14 segments, the fifth with a length about four times its diameter and with unusually heavy, somewhat flattened circumfili apically and at the basal third. On some of the basal segments there are irregular anastomosing of the circumfili, suggesting the condition obtaining in

certain species of *Cincticornia*. The twelfth antennal segment with a length one-fourth greater than its diameter, the thirteenth with a length equal to its diameter, and the fourteenth a flattened spheroid. Palpi; the first segment subquadrate, the second with a length over twice its width, the third slender, indistinctly segmented near the middle, somewhat expanded distally and with a length over twice that of the third. Mesonotum dark brown or black. Scutellum fuscous orange, postscutellum fuscous yellowish brown. Abdomen brownish black, the pleuræ reddish. Halteres pale yellowish, fuscous subapically. Legs brownish black; claws stout, strongly curved, the pulvilli as long as the claws. Ovipositor nearly as long as the body and presenting the usual characteristics of the genus.

Exuvium.—Length 2 mm. The anterior portion variably infusate, the thoracic horns long, stout, triangular in outline, the external margin finely serrate, and the surface minutely and irregularly striate. Wing cases extending to the third abdominal segment and the leg cases to the fifth. The anterior portion of the dorsum of the abdominal segments with a broad, transverse, nearly uniform band of stout, triangular, chitinous processes; posterior extremity broadly rounded. Type Cecid. 1632.

**Asphondylia chrysothamni** new species.

The gall described below was reared by Mr. P. H. Timberlake May 12-14, 1914, from bud galls on the rayless goldenrod, *Bigelovia graveolens*, collected near Murray, Utah. This species is apparently related to *A. eupatorii* Felt from which it may be easily separated by the markedly shorter twelfth antennal segment and also by palpal and colorational characters.

Gall.—Swollen or enlarged leaf buds with a length of 5 to 6 mm. and a diameter of 3 mm., the walls being composed of short, ovate, aborted, glume-like leaflets without any specialized central cell.

Exuvium.—Length 3.75 mm., light brown, the heavier, chitinized portions at the anterior extremity somewhat darker; antennal horns somewhat curved, triangular, smooth, acute apically, the antennal cases extending to the base of the abdomen, the wing cases to the base of the second abdominal segment, and the leg cases to the base of the fourth abdominal segment; posterior extremity rounded; the dorsum of the abdominal segments with a transverse row of stout, tooth-like spines near the posterior third and irregular, scattering spines representing two or three rudimentary, transverse rows on the basal half of each segment.

Female.—Length 3.5 mm. Antennæ nearly as long as the body, sparsely haired, blackish, the third antennal segment with a length seven times its diameter, the twelfth with a length a little greater than its diameter, the thirteenth a little shorter than the twelfth, the fourteenth globose. Palpi; first segment irregularly subquadrate, with a length over twice its diameter, the second moderately long, stout, with a length less than twice that of the first.

The face, the occipital margin on the top and sides of the head, a triangular spot on the propleura, a small spot below the insertion of the wings, and a narrow sclerite between the middle and hind coxæ, creamy white; the neck yellowish with a narrow, longitudinal, blackish sclerite on each side. Mesonotum, scutellum and postscutellum slate-colored. Abdomen sparsely clothed with light brown or reddish hairs, black; pleura brownish yellow. Wings hyaline, the legs blackish, except that the posterior tibiae and tarsi are brownish; claws stout, evenly curved, the pulvilli as long as the claws. Ovipositor about as long as the abdomen.

Male.—Length 3.5 mm. Antennæ nearly as long as the body, sparsely haired, blackish; 14 segments, the third with a length five times its diameter, and the fourteenth with a length over three times its diameter. Palpi; first segment irregularly quadrate, curved, with a length over twice its diameter, the second segment slender, tapering and more than twice the length of the first. Color very similar to that of the female but the abdomen is more slate-colored like the thorax, the pleuræ being reddish, the hind tibiae and the first tarsal segment blackish, the four distal tarsal segments being paler. Basal clasp segment short, very stout; terminal clasp segment short, greatly swollen, bidentate, the teeth very asymmetrical; dorsal plate moderately long, divided, the lobes tapering roundly to a narrowly rounded, thickly setose apex. Color characters after Timberlake. Type Cecid. 1613.

*Asteromyia gutierreziae* new species.

The midges described below were reared by Mr. P. H. Timberlake in May and June, 1914, from a black, blister-like gall on the slender flower stems of *Gutierrezia sarothrac*, collected near Salt Lake City, Utah. The species produces a gall very similar to that of *Asteromyia carbonifera* Felt and the adult presents many characters in common with this widespread eastern species, from which it is most readily separated by the third vein uniting with costa near the distal third and the moderately stout, obtuse harpes with a conspicuous, eccentric, quadrate, chitinous tooth. In the eastern *C. carbonifera* the third vein unites with costa near the basal half, while the harpes taper to a decidedly slender apex bearing a conspicuous, quadrate tooth. The insect hibernates in the gall and Mr. Timberlake is of the opinion that there may be two generations annually, since he has reared the insect in numbers during May and June and in September observed galls on new growth showing pupal exuviae, these latter being indications of a second brood.

Gall.—Irregular, dull black thickenings of the slender flower stems, ranging in length from 6 to 8 mm. and approximately doubling the thickness of stems, with a diameter of .5 mm. Except for its location the deformation is very similar to that of *C. carbonifera*.

Larva.—Length 2 mm., bright orange yellow, the breastbone reddish brown, enlarged apically, tridentate, the teeth blunt and the middle one slightly the longer.

Male.—Length 2 mm. Antennæ brownish black; 15 segments, the fifth with a length three-fourths its diameter, the terminal segment slightly produced and obtusely rounded. Palpi; first segment irregularly oval, moderately stout, the second nearly as long and as stout as the first. Occiput densely covered with black scales, the eyes margined with white scales and the face with a few rather short, white hairs near the middle. Mesonotum probably dark brown or black, the margins with groups of moderately long white hairs. Abdomen black, the segments margined posteriorly with white scales; the venter suffused with white scales; genitalia black. Coxæ black, with a spot of white scales at the base; femora mostly white scaled, black beneath, the hind pair almost entirely white; tibiæ black above, white beneath; tarsi black, the segments annulate with white basally; claws stout, strongly curved. Genitalia; basal clasp segment moderately stout; terminal clasp segment long, swollen basally; dorsal plate moderately long, triangularly incised, the lobes broadly rounded; ventral plate long, broadly rounded. Harpes broad, tapering slightly to a truncate apex bearing a stout, quadrate, chitinous tooth.

Female.—Length 2 mm. Antennæ with 16 segments, the fifth with a length three-fourths its diameter; terminal segment apparently compound, composed of two closely fused. Palpi; first segment irregularly quadrate, curved, the second a little longer, broadly fusiform. Ovipositor with a length about half the abdomen, the terminal lobes broadly orbicular and sparsely setose. Type Cecid. 1623.

#### **Asteromyia grindeliæ** Felt.

1912. Felt, E. P. N. Y. Ent. Soc. Jour. 20: 149.

This species was first reared July 27, 1911, by Mr. P. H. Timberlake from blister leaf galls on *Grindelia robusta* collected near Santa Barbara, Cal., and again October 20, 1915, from a greenish or blackish, oval, blister gall on *G. cuneifolia* collected in a salt marsh at Milebrae, Cal.

Gall.—The gall on *G. cuneifolia* is a typical greenish or oval, blister leaf gall with a diameter of 3 or 4 mm.

Male.—The specimen reared in 1915 differs somewhat from that obtained in 1911, in that there are 15 antennal segments, the fifth with a length about three-fourths its diameter, the terminal segment somewhat produced, compound and with a length about one-half greater than its diameter; the abdomen with the first four segments black and submedian whitish spots, those on the first segment quadrate and on the others subtriangular and separated by a moderately broad, black line; the distal segments vary from yellowish to reddish brown.

Female (previously unknown).—Length 2.25 mm. Antennæ probably with

18 segments, the fifth with a length about three-fourths its diameter; dorsum of the abdomen black, with white markings as follows; the basal segment with the distal third white, laterally, the white extending to the basal half of the segment and interrupted mesially by a moderately broad, black, median line, the second to the fifth abdominal segments with lunate, submedian white markings and conspicuous triangular ones laterally; the sixth with the submedian markings extending and confluent with the lateral ones, and the seventh white, except for an oval, median, black spot. Ovipositor about one-half the length of the abdomen, the terminal lobes broadly oval. Otherwise nearly as in the male. Colors after Timberlake. Cecid. 1639.

It is possible that the species infesting *G. cuneifolia* is distinct, though the probabilities are against this, and for the present we have tentatively referred it to the above named form. It is desirable to rear a goodly series of midges from both host plants in order that more careful comparisons can be made.

**Lasioptera echinochloa** new species.

The midges described below were reared in August and September, 1915, by Mr. C. N. Ainslie from injured or infested stems of crippled plants, *Echinochloa crusgalli* collected at Elk Point, S. D. The larvæ are usually found in numbers in fibrous, somewhat decayed stubbs in the crown and were also taken from lower normal portions of the stem. The species is allied to *L. lactuca* Felt, from which it may be easily distinguished by the almost total lack of scales upon the mesonotum. Mr. Ainslie reared a species of *Polymecus* from this midge.

Larva.—Length 2.5 mm., moderately stout, pale salmon, the head moderately large, tapering to a narrowly rounded apex; antennæ biarticulate; breastbone tridentate, the median tooth slightly shorter, the posterior extremity broadly rounded; skin coarsely shagreened.

Puparium.—Length 3 mm., a pale brownish straw, somewhat fusiform, both extremities rounded.

Exuvium.—Length 2.5 mm., whitish transparent; antennal cases hardly extending to the base of the abdomen, the wing cases to the base of the third abdominal segment, and the leg cases of the first, second and third pair of legs to the fourth, sixth and seventh abdominal segments, respectively; the basal two-thirds of the dorsum of each abdominal segment thickly set with minute, chitinous points.

Female. Length 1.5 mm. Antennæ extending to the base of the abdomen, sparsely haired, dark brown; 20 segments, the fifth with a length about equal to its diameter; terminal segment reduced, narrowly oval. Palpi; first segment irregular, subquadrate, the second narrowly oval, the third one-half

longer, more slender, the fourth a little longer and more slender than the third. Mesonotum shining black. Scutellum yellowish brown, postscutellum a little darker. Abdomen black, with rather inconspicuous silvery white, submedian, lunate spots, the seventh segment mostly whitish; venter suffused with dull silvery scales. Wings with subcosta uniting with the margin at the basal half, the discal spot obscure. Halteres, coxæ and femora basally, yellowish, the distal portion of femora, tibiæ and tarsi mostly dark brown; claws slender, strongly curved, the pulvilli as long as the claws. Ovipositor about two-thirds the length of the abdomen, the terminal lobes slender, lanceolate, with a length about four times the width and rather thickly setose.

Male.—Length 1.5 mm. Antennæ hardly extending to the base of the abdomen; 16 segments, the fifth with a length one-fourth greater than its diameter; terminal segment broadly oval. Palpi; first segment subquadrate, irregular, the second narrowly oval, the third a little longer, more slender, the fourth one-half longer and more slender than the third. Genitalia; basal clasp segment rather long, slender; terminal clasp segment long, swollen basally; dorsal plate broad, broadly and triangularly emarginate, the lobes tapering to a broadly rounded apex; ventral plate moderately long, broad and tapering to a narrowly rounded apex. Halteres moderately broad, tapering slightly to an irregular, tuberculate apex. Colors probably much as in the female. Type Cecid. a2719, Webster 11,876.

#### *Lasioptera inustorum* new species.

This midge was reared in May, 1915, by Mr. C. N. Ainslie from blackened leaf sheaths of *Panicum virgatum* collected at Elk Point, S. D. This species runs in our key to *L. impatientifolia* Felt, a species which also produces a carbonaceous discoloration in vegetable tissues. A most striking difference between the two is in the much produced lobes of the ovipositor of this western midge.

The leaf sheath of the infested plants shows an irregular, somewhat diffuse blackening near its base. The blackened area may have a length of 3 cm. and extend more than half way around the stem, the latter being unaffected. Within the blackened tissues there may be found larval cells, the larvæ occurring in tubular, silk-lined cavities some 5 to 6 mm. long.

Larva.—Length 2.5 mm., rather long, slender, reddish orange, the head rather small, the antennæ long, biarticulate; breastbone long, slender, bidentate, with a minute, median tooth; skin coarsely shagreened, the posterior extremity broadly rounded.

Exuvium.—Length 2 mm., whitish transparent, the antennal cases hardly extending to the base of the abdomen, the wing cases to the third abdominal segment, and the first, second and third pairs of legs to the fourth, fifth and sixth abdominal segments, respectively. There are numerous minute, chitinous



points on the distal three-fourths of the dorsum of the abdominal segments.

Male.—Length 1.5 mm. Antennæ hardly reaching to the base of the abdomen, sparsely haired, black; 16 segments, the fifth with a length a little greater than its diameter; terminal segment reduced, narrowly oval. Palpi; first segment short, subquadrate, the second narrowly oval, the third a little longer, more slender, the fourth one-half longer and more slender than the third. Mesonotum, scutellum and postscutellum probably black. Abdomen dark brown, the segments posteriorly sparsely margined with dull silvery scales. Genitalia yellowish. Wings hyaline, the third vein uniting with the dark brown costa at the basal third, the discal spot obsolete. Halteres and legs mostly pale yellowish straw, the distal portion of femora and the basal portion of tibiæ and the distal tarsal segments yellowish white; claws slender, strongly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment rather long, slender; terminal clasp segment rather short, swollen basally; dorsal plate moderately long, broad, deeply and roundly emarginate, the lobes narrowly rounded; ventral plate moderately long, broad, roundly truncate. Harpes broad at base, tapering to a slender, prolonged, chitinous internal tooth.

Female.—Length 2 mm. Antennæ reaching nearly to the base of the abdomen, sparsely haired, black; 20 segments, the fifth with a length three-fourths its diameter; terminal segment broadly oval. Palpi; first segment subquadrate, the second narrowly oval, the third a little longer and more slender, the fourth one-half longer than the third. Ovipositor about one-half the length of the abdomen, the terminal lobes slender, with a length five times the width, sparsely setose and narrowly rounded apically. Color characters presumably nearly as in the male. Type Cecid. a2715, Webster 11,881.

**Rhopalomyia enceliæ** new species.

A series of midges were reared April 18 and 20, 1913, by Mr. P. H. Timberlake from a greenish or dark gray, conical, globose, thick-walled gall sometimes confluent and distorting the stem. This species is easily distinguished from all other American *Rhopalomyias* described as having but fourteen antennal segments.

Gall.—Conical, thick-walled, lateral bud gall, length 6 mm., diameter 3 mm., frequently confluent basally, sometimes twisting the stem and producing a marked deformation of the plant. The apex of individual galls may be evenly rounded or flattened with flaring lips, which latter are sometimes produced as small, leafy expansions. There is a more or less distinct orifice as in the case of galls produced by *Phytophaga rigida* O. S.

Female.—Length 2.5 mm. Antennæ extending to the second abdominal segment, sparsely haired, brown, the basal segments black; 14 subsessile segments, the fifth with a stem about one-fifth the length of the subcylindric basal enlargement, which latter has a length two and one-half times its diameter; terminal segment somewhat produced, evidently composed of two closely fused and with a length about three and one-half times its diameter. Palp consist-

ing of one small, narrowly oval segment bearing one or more long, stout setae. Mesonotum and abdomen black, shining; halteres yellowish basally, reddish apically. Legs a pale straw; claws moderately slender, strongly curved, the pulvilli as long as the claws. Ovipositor nearly as long as the abdomen, the terminal lobes narrowly oval. Type Cecid. 1627.

**Rhopalomyia salviae** new species.

The midges characterized below were reared by Mr. P. H. Timberlake in May, 1912, from several collections of leaf galls on *Salvia* (*Ramona*) *californica* and *S. nivea*, collected in the Puente Hills near Whittier, Cal. This gall was also collected by Professor E. P. Van Duzee January 10, 1914, at Alpine, Cal. This species runs in our key to near *R. antennariae* Whlr. or *R. gutierreziae* Felt, from both of which it appears to be quite distinct.

Gall.—Leaflets of *S. californica* and presumably adjacent leaflets are dwarfed by the formation of a conspicuous conical, minutely pubescent, grayish brown, thick-walled gall having a length of 1 cm. and a diameter of .6 cm. The structure appears to be a greatly thickened, hypertrophied leaf, only rudiments remaining, the walls being spongy and the interior containing an oval larval cell with a length of about 3 mm. The midge evidently escapes through an apical opening somewhat resembling that in the gall of *Phytophaga rigida* O. S. A very different leaf gall, apparently produced by the same midge, occurs on the margins of moderately well developed leaves. It is a typical thin-walled, tubular gall with a length of about 6 mm., a diameter of 1.5 mm. The interior is occupied by an elongate larval chamber. Basally the gall is concolorous with the leaf, the distal third being purplish, the slightly curved apex a little lighter. A modification of the first type of gall is seen on the aborted leaflets of *S. nivea* (or *leucophylla*). These galls are irregularly obconical, with a length of about 7 mm., a diameter of 3 mm. and are more or less confluent, otherwise nearly as described above.

Exuvium.—Length 2.25 mm., mostly whitish transparent, the anterior thickened portions of the head and thoracic structures brownish. Antennal horns short, stout, indistinctly bidentate, the lateral process decidedly longer; antennal cases extending to the base of the abdomen, wing cases to the third abdominal segment, and leg cases to the fifth abdominal segment; the posterior extremity rather broadly rounded, the dorsal surface of the abdominal segments thickly spotted with minute, chitinous points.

Male.—Length 2.5 mm. Antennae extending to the third abdominal segment, sparsely haired, the two basal segments black, the others dark brown; 14 to 16 segments, the fifth with a stem three-fourths the length of the cylindrical basal enlargement, which latter has a length one and one-half times its diameter; terminal segment reduced, narrowly oval. Palpi; first segment irregular, with a length about twice its diameter, the second reduced, narrowly oval. Mesonotum and scutellum black, naked. Abdomen mostly black, the

distal two segments brownish and the basal portion of the genitalia gray. Coxæ black, legs brownish, the claws moderately stout, strongly curved, the pulvilli nearly as long as the claws. Genitalia; basal clasp segment stout, moderately broad, the basal third with scattered, subconical tuberosities; terminal clasp segment moderately stout, tapering, strongly curved; dorsal plate deeply and triangularly incised, the lobes broadly rounded; ventral plate indistinct; harpes long, broad, the distal margin narrowly rounded and subapically a chitinous ridge with three or four quadrate teeth; style long, narrowly rounded apically.

Female.—Length 2.25 mm. Antennæ extending to the base of the abdomen, sparsely haired; 15 sessile segments, the fifth with a length two and one-half times its diameter; terminal segment somewhat produced, with a length about three times its diameter, the apex narrowly rounded. Palpi; first segment irregular, quadrate, the second broadly and irregularly oval, Ovipositor probably nearly as long as the abdomen, the terminal lobes narrowly oval and finely pubescent. Coloration nearly as in the male. Color characters after Timberlake. Type Cecid. 1624, C. 1626.

#### *Rhopalomyia ampullaria* new species.

A few midges were reared July 6, 1913, by Mr. P. H. Timberlake from a flask-shaped leaf gall on sage bush, *Artemisia tridentata*, taken near Salt Lake City, Utah. This species may be distinguished from related forms by the uniarticulate palpi and the small number of antennal segments.

Gall.—A somewhat flask-shaped or subconical, solitary or confluent white pubescent leaf gall, diameter at base 2 mm., height 3 mm. A section shows the basal portion of the gall to be thick-walled, with an oval cell having a length of about 1.5 mm. and a distal tubular, thin-walled portion separated from the larval cell only by a thin, matted layer of filaments, the top being lightly filled with a curled, woolly mass.

Exuvium.—Length 2 mm., moderately stout, the thicker, chitinous portions slightly colored, the other parts semi-transparent; antennal horns rudimentary, represented by rounded processes; antennal cases extending to the second abdominal segment, the wing cases to the third, and the leg cases to the fifth; posterior extremity broadly rounded.

Female.—Length 2.5 mm. Antennæ extending to the base of the abdomen, sparsely haired; 15 sessile segments, the fifth with a length two and one-half times its diameter; terminal segment somewhat reduced, tapering to a narrowly rounded apex. Palp consisting of one moderately long, stout, fusiform segment with a few stout setæ apically. Mesonotum reddish brown. Scutellum yellowish, postscutellum a little darker. Abdomen yellowish orange, the ovipositor yellowish. Halteres pale yellowish. Legs pale straw; claws moderately stout, strongly curved, the pulvilli as long as the claws. Ovipositor about one-half the length of the abdomen, the terminal lobes narrowly

oval, with a length about twice the width and rather thickly setose. Type Cecid. 1618.

**Rhopalomyia grindeliæ** new species.

This species was reared by Mr. P. H. Timberlake in October, 1915, from apparently unmodified flower heads of tar weed, *Grindelia cuneifolia*, collected on a salt marsh near Millbrae, Cal.

Gall.—The flower heads from which this species was reared presented no external modifications. The larvæ apparently inhabit individual florets, rendering them hollow and infertile.

Male.—Length 2.5 mm. Antennæ extending to the third abdominal segment, sparsely haired, yellowish brown; 16 segments, the fifth with a stem as long as the cylindric basal enlargement, the latter with a length about one-half greater than its diameter; terminal segment with the basal portion somewhat reduced, with the apical stem represented by a long, somewhat enlarged, fusiform, setose appendage. Palpi probably biarticulate, the distal segment long, somewhat expanded distally and with a length four times its diameter. Mesonotum shining dark brown, the scutellum and postscutellum a little lighter. Abdomen dark brown. Genitalia fuscous yellowish. Halteres yellowish basally, fuscous apically. Coxæ yellowish, legs pale straw; claws long, slender, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment short, broad; terminal clasp segment rather short, swollen near the middle; dorsal plate broad, broadly and triangularly emarginate; ventral plate broad, very broadly and roundly emarginate. Harpes stout, divergent, tapering to irregular, strongly tuberculate appendages.

Female.—Length 3.5 mm. Antennæ extending to the base of the abdomen, sparsely haired, yellowish brown; 17 cylindrical, sessile segments, the fifth with a length about twice its diameter; terminal segment produced, with a length three times its diameter, tapering to an obtuse apex. Palpi; the first segment short, subquadrate, the second with a length four times its diameter and tapering slightly to a broadly rounded apex. Mesonotum shining dark brown. Scutellum yellowish brown, postscutellum dark brown. Abdomen dark red, the ovipositor and apical segments pale brown; thorax and abdomen sparsely clothed with long, black pubescence. Halteres and legs yellowish brown. Ovipositor as long as the abdomen, the terminal lobes narrowly lanceolate, with a length four times the width and sparsely setose. Type Cecid. 1638.

**Rhopalomyia utahensis** new species.

A number of midges were reared by Mr. P. H. Timberlake in May, 1913, from an ovoid bud gall on rabbit brush, *Chrysothamnus graveolens*, collected in the vicinity of Murray, Utah. The gall, as described by Mr. Timberlake, presents characters very similar to those of *Cecidomyia strobiloides* Towns. (*Psyche*, 7: 176, 1894), and it is

possible that the galls are produced by the same species. This insect runs in our key to *R. crassulina* Ckll., from which it may be easily separated by its distinctly larger size and also by well marked structural differences.

Gall.—Ovoid, hypertrophied leaf buds, length 10 to 11 mm., diameter 7 to 8 mm., two or three frequently being confluent, monothalamous, green or somewhat purplish and externally with short, recurved, aborted leaflets covered with a rather thick, gray arachnose pubescence. Apparently the same species was reared from a similar more globose leaf bud gall at once distinguishable by the absence of pubescence.

Male.—Length 3 mm. Antennæ extending to the fourth abdominal segment, sparsely haired, grayish yellow, the first two segments black; 18 segments, the fifth with a stem three-fourths the length of the cylindric basal enlargement, which latter has a length nearly twice its diameter; terminal segment with a length three times its diameter and tapering slightly to an irregularly rounded apex. Palpi presumably biarticulate. Mesonotum shining black. Scutellum and postscutellum probably dark reddish brown. Abdomen probably dark brown, the pleuræ fuscous yellowish. Halteres whitish basally, fuscous apically. Legs pale yellowish or grayish, sparsely black-haired; claws moderately slender, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment stout, broad; terminal clasp segment rather stout, long; dorsal plate broad, deeply and triangularly emarginate, the lobes broadly rounded laterally; ventral plate broad, broadly and roundly truncate. Harpes moderate long, slightly divergent and irregularly rounded apically; style short, stout.

Female.—Length 3 mm. Antennæ extending to the third abdominal segment, sparsely haired, dark grayish, the first two segments black; 18 subsessile segments, the fifth with a length two and one-half times its diameter; terminal segment slightly produced and narrowly oval. Palpi; first segment somewhat produced, subquadrate, the second irregular, tapering distally to an acute apex and with a length about three times its diameter. Mesonotum and dorsal sclerites of abdomen shining black. Scutellum and postscutellum probably dark brown; pleuræ yellowish gray with a slight reddish tinge. Ovipositor short, with a length probably less than half that of the abdomen, the terminal lobes broadly oval and sparsely setose. Other characters practically as in the male. Colors mostly after Timberlake. Type Cecid. 1608.

***Rhopalomyia chrysothamni* new species.**

This midge was reared in May, 1913, by Mr. P. H. Timberlake from a pubescent, variable, conical, stem gall on rabbit brush, *Chrysothamnus graveolens*, collected in the vicinity of Murray, Utah. The species approaches closely *R. utahensis*, from which it may be most easily separated by its decidedly smaller size, the fewer antennal segments and particularly by the peculiar type of gall.

Gall.—A variable, conical outgrowth of the stem with a height of about 4 mm. and a basal diameter of 2 to 3 mm. The gall contains basally, an oval, thin-walled cell with a length of 2.75 mm. and a diameter of 1.75 mm., the hollow, distal portion being filled with a slender, thread-like growth of delicate cells placed end to end and forming a rounded or, in some cases, nearly truncate plug.

Exuvium.—Length 1.5 mm., moderately stout, the anterior thicker portions brownish, the thinner parts semi-transparent; antennal horns short, stout, feebly and unequally bidentate, the antennal cases extending to the base of the abdomen, the wing cases to the third abdominal segment, and the leg cases to the fourth and fifth abdominal segments; posterior extremity broadly rounded; the dorsum of the abdominal segments with numerous minute, chitinous points.

Male.—Length 2.5 mm. Antennæ nearly as long as the body, sparsely haired, the basal antennal segments black, the others yellowish; 17 segments, the fifth with a stem three-fourths the length of the cylindrical basal enlargement, which latter has a length about one and one-fourth times its diameter; terminal segment somewhat reduced, tapering to a narrowly rounded apex. Palp consisting of one moderately long, stout segment. Head, thorax and the abdomen basally black, the distal segments of the abdomen mostly yellowish. Legs yellowish white or grayish, the tibiæ and tarsi paler, the coxæ and femora darker; claws slender, strongly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment moderately long, stout; terminal clasp segment long, stout; dorsal plate broad, deeply and triangularly emarginate; ventral plate moderately long, broad, deeply and roundly emarginate, the lobes rather broad and broadly rounded.

Female.—Length 1.5 mm. Antennæ extending to the fourth abdominal segment, sparsely haired, yellowish gray; 16 segments, the fifth with a length about two and one-half times its diameter; terminal segment somewhat produced and frequently fused with the preceding. Mesonotum black. Abdomen cherry red, the distal segments and the ovipositor yellowish gray. Halteres yellowish with a white pubescence. Claws strongly curved, the pulvilli longer than the claws. Ovipositor short, with a length about one-fourth that of the abdomen, the terminal lobes orbicular, sparsely setose. Otherwise nearly as in the male. Color characters after Timberlake. Type Cecid. 1614.

***Rhopalomyia glutinosa* new species.**

The midges described below were reared May 10, 1913, from a shining, glabrous, cortical swelling on the stem of rabbit brush, *Chrysothamnus graveolens*. The female presents many characters in common with that of *R. chrysothamni*, from which it may be most easily separated by the more reduced terminal antennal segments, the longer ovipositor and the narrowly oval, more setose terminal lobes.

Gall.—These are green, glabrous, cortical stem swellings which, as they age, become brown and present a very close resemblance to a group of Lecaniums. The gall has a height of about 2 mm. and a diameter of 3.5 mm., the midge escaping through a circular apical orifice.

Exuvium.—Very similar to that of *R. chrysothamni*.

Female.—Length 2.25 mm. Antennæ extending to the fourth abdominal segment, sparsely haired, brown, the two basal segments blackish; 16 segments, the fifth with a length two and one-half times its diameter, the distal segment reduced, with a length about twice its diameter. Palp consisting of a moderately short, broad segment having a length about twice its diameter. Mesonotum grayish black, with the lateral margins and median line black; abdomen dull red with the sclerites, the last two segments and the base of the ovipositor grayish black. Halteres pale yellowish. Anterior and mid legs fuscous, the hind legs, except the coxæ, pale yellowish gray; claws strongly curved, the pulvilli decidedly longer than the claws. Ovipositor with a length about one-half that of the abdomen, the terminal lobes narrowly oval and rather thickly setose. Type Cecid. 1615.

***Rhopalomyia erigerontis* new species.**

The one male described below was reared by Mr. P. H. Timberlake in April, 1913, from a gall found on a plant provisionally identified as *Erigeron fragilis* and collected at Whittier, Cal.

Gall.—This is an oval apical bud deformation with a length of 10 mm. and a diameter of 7 mm., the modified leaflets being thickly clothed with a short white pubescence.

Exuvium.—Length 2.75 mm., mostly whitish transparent, the denser portions of the head and thorax brownish. Antennal horns short, stout, tapering to a broadly excavated apex; antennal cases hardly extending to the base of the abdomen, the wing cases to the third abdominal segment and the leg cases to the sixth abdominal segment; posterior extremity broadly rounded the dorsum of the abdominal segments dotted with very minute, chitinous points.

Male.—Length 2.25 mm. Antennæ extending to the third abdominal segment, sparsely haired, pale yellowish brown; 18 segments, the fifth with a stem as long as the cylindrical basal enlargement, which latter has a length about one-fourth greater than its diameter; terminal segment irregular, oval or subcylindrical and tapering to an irregularly rounded apex. Palp consisting of one segment composed of a narrow, oval basal portion and a slender, finger-like apical part. Mesonotum reddish brown. Scutellum and postscutellum a little lighter. Abdomen fuscous yellowish. Genitalia darker. Halteres yellowish transparent. Coxæ yellowish brown, the legs a nearly uniform pale straw; claws slender, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment very irregular, excavated internally and slightly recurved at the slender apex; both dorsal and ventral plates long, broad, broadly and roundly emarginate, the former broader. Harpes stout, tapering to a narrowly rounded apex; style short, stout. Type Cecid. 1629.

**Rhopalomyia ericameriæ** new species.

This species was reared by Mr. P. H. Timberlake April 21, 1913, from a small, rosette gall on *Ericameria (Chrysoma) palmeri*, collected in the Puente Hills near Whittier, Cal. The adults, aside from food preferences and general structures, may be most easily separated from related forms by the strongly marked characters of the male genitalia and the unusually short ovipositor of the female.

Gall.—This is a deformed or aborted, usually lateral branchlet forming a small rosette, frequently with the tip more or less recurved, length 1.5 cm., diameter 1 cm.

Exuvium.—Length 2.5 mm., moderately stout, whitish, except for the thicker portions of the chitin anteriorly. Antennal horns rudimentary, the antennal cases not reaching to the base of the abdomen, the wing cases to the second abdominal segment and the leg cases to the fourth and fifth abdominal segments; the dorsum of the abdominal segments with very minute, chitinous points; posterior extremity broadly rounded.

Male.—Length 3.25 mm. Antennæ extending to the third abdominal segment, thickly haired, probably yellowish brown; 18 segments, the fifth with a stem three-fourths the length of the cylindric basal enlargement, which latter has a length about two and one-half times its diameter; terminal segment somewhat reduced, with a length over twice its diameter and tapering to a narrowly rounded apex. Palp consisting of one long, somewhat capitate segment with a length about three times its greatest diameter. Mesonotum dark reddish brown. Scutellum reddish brown, postscutellum a little lighter. Abdomen brownish red, the genitalia yellowish. Halteres yellowish basally, fuscous apically. Legs mostly a pale straw. Genitalia; basal clasp segment long, stout; terminal clasp segment moderately long, slightly swollen near the middle; dorsal plate long, broad, triangularly emarginate, the lobes somewhat divergent and broadly rounded; ventral plate long, broad, broadly and roundly emarginate. Harpes broad, obliquely truncate apically, the distal margin somewhat recurved; style rather short, stout.

Female.—Length 2.25 mm. Antennæ missing. Palp consisting of one moderately stout segment with a length nearly four times its diameter, the distal fourth tapering. Mesonotum probably darker and the abdomen presumably redder than in the male. Ovipositor with a length about one-half that of the abdomen, the terminal lobes broadly oval and sparsely setose. Color characters largely conjectural. Type Cecid. 1637.

**Phytophaga wellsii** new species.

The midges were reared by Mr. B. W. Wells March 20, 1916, from a somewhat top-shaped leaf gall on hackberry, *Celtis occidentalis*, collected presumably in the vicinity of Columbus, O.



Gall.—Monothalamous, somewhat top-shaped, the walls moderately thick and the surface sparsely clothed with a whitish, appressed pubescence, the greatest diameter ranging from 3 to 4 mm.

Larva.—Whitish, stout, the posterior extremity rounded, the breastbone rather broad, short, with two long, widely separated teeth, the excavation broadly rounded; skin coarsely shagreened.

Male.—Length 2 mm. Antennæ nearly as long as the body, rather sparsely long-haired, yellowish brown; 16 segments, the fifth with a stem one-half the length of the cylindric basal enlargement, which latter has a length about twice its diameter; terminal segment somewhat reduced, tapering slightly to a subconical, smooth apex. Palpi; first segment subquadrate, the second narrowly oval, nearly twice the length of the first, the third nearly twice the length of the second, more slender, the fourth one-half longer than the third, more slender. Mesonotum shining dull reddish brown, the margin sparsely brown-haired. Scutellum brownish, postscutellum yellowish orange. Abdomen coarsely white-haired, mostly dark brown, the incisures yellowish white. Wings hyaline; halteres yellowish transparent. Coxæ fuscous yellowish, the legs mostly pale straw, the pulvilli nearly as long as the claws. Genitalia; basal clasp segment long, stout; terminal clasp segment short, curved, swollen near the middle; dorsal plate long, broadly dilated apically, the rather slender lobes with a narrowly rounded, setose apex and diverging strongly; ventral plate moderately short, deeply and narrowly incised, the lobes long, rather broad and tapering slightly to a narrowly rounded, sparsely setose apex. Harpes stout, obscurely denticulate distally; style short.

Female.—Length 2.25 mm. Antennæ extending to the third abdominal segment, sparsely haired, dark yellowish; 18 sessile segments, the fifth with a length one-half greater than its diameter, the terminal segment reduced, roundly and broadly conical. Palpi; the first segment irregularly subquadrate, the second about as long as the first, the third one-half longer than the second, more slender, and the fourth more slender than the third and about twice as long. Mesonotum shining dark brown. Scutellum yellowish brown, postscutellum fuscous yellowish. Abdomen sparsely dark-haired, dark reddish orange, the ovipositor yellowish orange and with a length nearly as long as the abdomen. Halteres yellowish transparent basally, fuscous subapically, whitish apically. Coxæ dark brown; legs mostly dark brown. The lobes of the ovipositor short, roundly triangular and sparsely setose. Type Cecid. a2713.

*Phytophaga timberlakei* new species.

The midges described below were reared by Mr. P. H. Timberlake in March, 1915, from branches and limbs of willow, *Salix fendleriana*, collected by J. P. O'Gara near Salt Lake City, Utah, the preceding November. This species resembles *P. peroculta* Ckll., from which it may be separated by the decidedly shorter antennal stems in the male and the presumably shorter palpi. There are minor differences

in the male genitalia. The larvæ, according to Mr. Timberlake, may be found in tubular cells beneath the bark and cause hardly any external swelling.

Exuvium.—Length 4 mm. Whitish transparent, the antennal cases hardly extending to the base of the abdomen, the wing cases to the third abdominal segment, and the leg cases of presumably the fore, middle and posterior legs extending to the fourth, fifth and seventh segments, respectively. The dorsum of the abdominal segments with transverse rows of minute spines.

Male.—Length 3 mm. Antennæ extending to the third abdominal segment, sparsely haired, yellowish brown; 19 segments, the fifth with a stem one-half the length of the cylindrical basal enlargement, which latter has a length one-half greater than its diameter; terminal segment produced, tapering slightly to a narrowly rounded apex and with a length two and one-half times its diameter. Palpi obscure in the preparation. Mesonotum reddish brown. Scutellum and postscutellum lighter. Abdomen yellowish orange. Legs pale straw; claws moderately stout, evenly curved, the pulvilli as long as the claws. Genitalia; basal clasp segment stout; terminal clasp segment moderately long tapering strongly distally; dorsal plate broad, broadly and triangularly emarginate, the lobes broadly expanded, broadly oval and sparsely setose; ventral plate moderately long, broad, deeply and roundly emarginate, the lobes moderately short, broad and tapering to a broadly rounded apex. Harpes short, broad, obliquely truncate and at the internal angle a stout, quadrate, chitinous tooth; style short, stout.

Female.—Length 3.5 mm. Antennæ extending to the first abdominal segment, sparsely haired, yellowish brown; 20 sessile segments, the fifth with a length one-fourth greater than its diameter, the terminal segment slightly produced, narrowly oval, with a length over twice its diameter. Palpi; first segment short, quadrate, the second a little longer, broader, the third a little longer and more slender than the second, the fourth about twice the length of the third, moderately stout. Ovipositor about three-fourths the length of the abdomen, terminal lobes short, broadly oval and sparsely setose. Color characters in both sexes largely conjectural. Type Cecid. 1646.

#### KEY TO THE SPECIES OF DIARTHROMYIA.

- a. 17 or 18 antennal segments, the fifth in the male with a stem three-fourths, and that of the female with a stem one-third the length of the basal enlargement, respectively.
- b. Mesonotum dark reddish brown, the abdomen reddish brown; terminal antennal segment of the male greatly produced; length, male 2 mm., female, 3 mm. Reared from a variable monothalamous or polythalamous, globose leaf bud or rosette gall or a bladdery leaf gall on *Artemisia tridentata* .....*artemisizæ* Felt.
- bb. Mesonotum dark brown, the abdomen pale orange; terminal antennal segment of the male usually reduced. Reared from an irregular, oval,

concolorous swelling with a length about 2 mm., usually at a distinct angle to the surface of the plant tissues, and frequently causing large, confluent swellings of the stem, leaf or flower head of *Chrysanthemum* .....hypogæa H. Lw.

aa. 15 or 16 antennal segments.

b. Antennal segments of the female subsessile, the fifth with a stem one-fifth the length of the cylindrical basal enlargement, the fifth of the male with a stem three-fourths the length of the basal enlargement. Reared from an oval, thin-walled, pubescent cell with a length about 1 mm. and attached at an oblique angle to the under side of the leaf or from flower buds of *Artemisia heterophylla* or a vertical, oval leaf gall on *A. tridentata* .....occidentalis n. sp.

aaa. 14 antennal segments.

b. Antennal segments of the female sessile, the fifth with a length twice its diameter, the fifth antennal segment of the male with a stem three-fourths the length of the basal enlargement; circumfili not greatly produced. Reared from a brownish or reddish subconical, thin-walled cell with a length of 1.5 mm., a diameter of .5 mm. and protruding at an oblique angle from the tissues of *Artemisia californica* .....californica Felt.

bb. Antennal segments of the female sessile, the fifth with a length four times its diameter, the circumfili greatly produced and frequently extending to or beyond the base of the next segment. Reared from irregular, lobulate, woolly masses, apparently lateral bud galls which are frequently confluent; individual galls with a diameter of 4 mm., on *Artemisia californica* .....floccosa n. sp.

**Diarthronomyia artemisiæ Felt.**

A series of midges were reared by Mr. P. H. Timberlake in May and June, 1915, from variable, globose, leaf bud and rosette galls on *Artemisia tridentata*, and also from a bladdery leaf gall found upon the same plant and collected near Salt Lake City, Utah. The leaf bud galls presented a marked variation in pubescence, the smaller ones being naturally more pubescent, while the larger ones, presumably because of the greater expansion of the normal surface of the plant, are decidedly less pubescent. The larger ones, according to Mr. Timberlake, are polythalamous, the others monothalamous. The bladdery leaf galls are notably softer than the others and less pubescent, as in the case of the larger leaf bud galls. The interior of these deformities is filled with loose, spongy matter composed of finely crinkled filaments surrounding one or more larval cells.

Exuvium.—Length 2 mm. Stout, the head, mesonotum, antennal and wing cases a variable reddish brown, the anterior horns small, the antennal

cases hardly extending to the base of the abdomen, the wing cases to the third abdominal segment, the leg cases to the fifth abdominal segment; dorsum of the abdomen nearly smooth, the posterior extremity broadly rounded.

*Diarthronomyia occidentalis* new species.

Numerous small midges were reared by Mr. P. H. Timberlake in September, 1912, from small, oval, thin-celled galls on the leaves of *Artemisia heterophylla*, collected at the Sweet Water Dam, San Diego County, Cal., and also from flower buds taken in the Puente Hills near Whittier. It was also reared from a similar, nearly vertical solitary or clustered grayish or almost black oval gall on the under side of leaves of *Artemisia tridentata* collected at Salt Lake City, Utah, in May, 1915. The species is a small one, the gall resembling very closely that produced by the European chrysanthemum midge, *D. hypogæa* H. Lw., and the adults have a close affinity with this species, though they may be easily distinguished therefrom by the somewhat smaller size and the smaller number of antennal segments.

Gall.—An oval, thin-walled, pubescent cell, length about 1 mm., attached to the under side of the leaf and at an oblique or nearly vertical angle to the supporting surface. Gall grayish on *A. heterophylla* or grayish or nearly black on *A. tridentata*. The galls in the flower buds are recorded by Timberlake as apparently the same though rather thinner walled.

Female.—Length 1.25 mm. Antennæ extending to the base of the abdomen, sparsely haired, pale flesh-colored; 14 to 15 subsessile segments, the fifth with a stem about one-fifth the length of the cylindrical basal enlargement, which latter has a length two and one-half times its diameter; terminal segment slightly reduced, narrowly rounded apically. Palpi; first segment small, globose, second smaller, subglobose. Eyes black; face yellowish. Mesonotum yellowish brown. Scutellum and postscutellum pale yellowish; abdomen pale reddish, fuscous yellowish distally. Legs pale yellowish, the claws slender, evenly curved, unidentate, the pulvilli a little shorter than the claws. Ovipositor about half the length of the abdomen, the terminal lobes rather long, roundly tapering to a narrowly rounded apex, sparsely setose.

Male.—Length 1.25 mm. Antennæ extending to the third abdominal segment, sparsely haired, pale yellowish; 15 or 16 segments, the fifth with a stem three-fourths the length of the cylindrical basal enlargement, which latter has a length two and one-fourth times its diameter; terminal segment produced, with a length about three times its diameter. Palpi; first segment short, subquadrate, second smaller, subquadrate. Coloration similar to the female, except that the abdomen is pale yellowish and the genitalia fuscous and the legs paler than in the female. Genitalia; basal clasp segment short, stout, broadly triangular; terminal clasp segment short, stout, with a conspicuous tooth apically; dorsal plate moderately long, triangularly emarginate, the lobes

broad, subtruncate apically; ventral plate long, broad, broadly and roundly emarginate. Harpes moderately stout, triangular, with a short, rounded, chitinous lobe at the internal distal angle; style short, stout. Type Cecid. 1633.

***Diarthronomyia floccosa*** new species.

The midges characterized below were reared by Mr. P. H. Timberlake, November 20 and 28, 1912, from large, woolly galls on *Artemisia californica* collected on the ridge between Mill Valley and the Muir Woods in Marin County Cal. Apparently the same gall was also found at Santa Barbara, Cal. This species approaches *D. californica* Felt, from which it may be easily separated by the relatively much longer antennal segments and the greatly produced circumfli. The gall is also very different.

Gall.—Irregular, lobulate, woolly masses apparently arising from lateral buds, frequently confluent, individual galls having a diameter of about 4 mm.

Female.—Length 1.25 mm. Antennæ extending to the third abdominal segment, sparsely haired, pale yellowish; 14 sessile, cylindrical segments, the fifth with a length four times its diameter, the distal circumfilum high and produced, frequently extending to or beyond the base of the next segment; terminal segment reduced, narrowly conical, with a length nearly three times its diameter and tapering to a narrowly rounded apex. Palpi probably biarticulate. Head black. Thorax mostly pale yellowish brown. Scutellum and postscutellum lighter. Abdomen crimson red, shading posteriorly to a fuscous yellowish brown. Wings hyaline, narrow, with a length fully twice the width; halteres pale yellowish brown. Legs pale yellowish; claws strongly curved, unidentate, the pulvilli nearly as long as the claws. Ovipositor nearly as long as the abdomen, apically slender, the terminal lobes relatively short, broad, tapering roundly to a narrowly rounded apex and sparsely setose. Color characters from Timberlake. Type Cecid. 1628.

***Monardia foliata*** new species.

The male described below was taken on a window and received under date of March 21, 1916, from Professor T. D. A. Cockerell, Boulder, Colo. It is quite different from the entire series with fourteen antennal segments, because of the distinctly longer stem of the fifth antennal segment. The genitalia are also peculiar.

Male.—Length 2 mm. Antennæ nearly as long as the body, sparsely haired; 14 segments, the fifth with a stem one-fourth longer than the basal enlargement, which latter has a length one-fourth greater than its diameter; terminal segment slightly produced, broadly conical. Palpi; first segment subquadrate, the second and third each a little longer and more slender, the fourth nearly one-half longer than the third. Mesonotum shining black. Scutellum and postscutellum dark reddish brown. Abdomen sparsely white-haired, dull black;

halteres yellowish transparent basally, yellowish brown apically. Legs mostly yellowish gray and sparsely clothed with moderately long, whitish hairs; distal tarsal segments somewhat darker; claws moderately stout, evenly curved, finely denticulate and with a minute tooth subapically, the pulvilli a little shorter than the claws. Genitalia; basal clasp segment very short, broad; terminal clasp segment moderately long, narrowly oval; harpes extended, foliate, the basal angles produced laterally as chitinous, tooth-like processes, obliquely truncate; distal angles with the margin strongly chitinized and bearing three or four short, stout teeth. Type Cecid. 1649.

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## THE CARPENTER-BEES OF THE UNITED STATES OF THE GENUS XYLOCOPA.<sup>1</sup>

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### INTRODUCTION.

This paper forms the major part of a thesis for the degree of master of science at the Massachusetts Agricultural College, and it has been prepared under the supervision of Dr. H. T. Fernald. It is an endeavor to make more easy the identification of the bees of this genus.

The collections upon which the work in this paper is based are those of the American Entomological Society in Philadelphia, the United States National Museum, the Museum of Comparative Zoölogy of Harvard University, the Brooklyn Museum, the Children's Museum of Brooklyn, the collection of the Massachusetts Agricultural College, the private collection of Dr. G. C. Crampton, and other smaller collections. The few types existing in this country have been examined and descriptions made from them, added to by the examination of a large series of specimens; redescriptions of all the species and a key for their separation are also included.

Earlier works and literature found to be of great value in the preparation of this paper are: Illiger, *Magaz. f. Insectenk.*, 1806; Lepeletier, *Hist. Nat. Insect. Hymen.*, II, 1841; Smith, *Cat. Hymen. Brit. Mus.*, II, 1854; Cresson's descriptions in the *Trans. Amer. Ent.*

<sup>1</sup> Contribution from the Entomological Laboratory, Massachusetts Agricultural College.